

What is claimed is:

1. A method of manufacturing a liquid crystal display (LCD) device, comprising:
forming a photo-sensitive layer over a substrate;
5 forming a photo-insensitive layer over the photo-sensitive layer;
exposing a portion of the photo-sensitive layer via a photo-mask to a radiation source;
and
contacting the portion of the photo-sensitive layer using a developing solution.

10 2. The method of claim 1, wherein said contacting dissolves the portion of the photo-sensitive layer and removes the portion of the photo-insensitive layer overlying the portion of the photo-sensitive layer together.

15 3. The method of claim 1, wherein the photo-insensitive layer is formed of photo-insensitive resin.

20 4. The method of claim 3, wherein the photo-insensitive resin is selected from the group consisting of photo-insensitive PFCB, photo-insensitive BCB, photo-insensitive polyimide and photo-insensitive SOG.

25 5. The method of claim 1, wherein the radiation source is electron beam radiation, x-ray radiation, or ultraviolet radiation.

6. The method of claim 1, wherein the developing solution includes an alkaline solution.

7. The method of claim 6, wherein said alkaline solution is TMAH.

8. The method of claim 1, wherein the photo-sensitive layer is formed of photo-sensitive resin.

30 9. The method of claim 8, wherein the photo-sensitive resin is selected from the group consisting of photo-sensitive acrylic resin, photo-sensitive BCB, photo-sensitive PFCB and photo-sensitive polyimide.

10. The method of claim 1, wherein the thickness of the photo-sensitive layer is between approximately 0.1 and 8 μm .

11. The method of claim 1, wherein the thickness of the photo-insensitive layer is between approximately 0.1 and 8 μm .

12. The method of claim 1, wherein the thickness ratio of the photo-insensitive layers to the total thickness of the photo-sensitive layer and photo-insensitive layer is not more than approximately 50%.

13. The method of claim 1, wherein the dielectric constant of the photo-sensitive layer is between approximately 2.5 and 4.0.

14. The method of claim 1, wherein the dielectric constant of the photo-insensitive layer is between approximately 1.5 and 3.5.

15. The method of claim 1, wherein the combined dielectric constant of the photo-sensitive layer and the photo-insensitive layer is between approximately 1.5 and 3.5.

16. The method of claim 1, wherein said forming the photo-insensitive layer and said forming the photo-sensitive layer are performed consecutively.

17. The method of claim 1, further comprising, curing the photo-insensitive layer and the photo-sensitive layer at the same time.

18. The method of claim 17, further comprising:
forming a transparent electrode layer overlying the resulting structure.

19. A method of manufacturing a liquid crystal display (LCD) device, comprising:
forming a gate bus line over an insulating substrate;
forming a gate insulator over the gate bus line;
forming a drain electrode over the gate insulator;
forming a photo-sensitive layer over a substrate;

forming a photo-insensitive layer over the photo-sensitive layer;
exposing a portion of the photo-sensitive layer via a photomask to a radiation source,
contacting the portion of the photosensitive layer using a developing solution through
the photo-insensitive layer to remove the portion of the photo-sensitive layer and an
5 immediately overlying portion of the photo-insensitive layer;
curing the photo-insensitive layer and the photo-sensitive layer at the same time; and
forming a transparent electrode layer overlying the resulting structure.

10 20. The method of claim 19, wherein the transparent electrode layer includes indium tin
oxide (ITO).

21. The method of claim 20, the insulating substrate is formed of transparent material.

15 22. The method of claim 19, wherein photo-insensitive layer is formed of
photo-insensitive resin.

23. The method of claim 21, wherein the photo-insensitive resin is selected from the
group consisting of photo-insensitive PFCB, photo-insensitive BCB, photo-insensitive
polyimide and photo-insensitive SOG.

20 24. The method of claim 18, wherein the developing solution comprises an
alkaline solution.

25 25. The method of claim 24, wherein said alkaline solution is TMAH.

26. The method of claim 18, wherein the photo-sensitive layer is formed of photo-
sensitive resin.

30 27. The method of claim 26, wherein the photo-sensitive resin is one selected from the
group consisting of photo-sensitive acrylic resin, photo-sensitive BCB, photo-sensitive PFCB
and photo-sensitive polyimide.

28. The method of claim 19, wherein the thickness of the photo-sensitive layer is between approximately 0.1 and 8 μm and the thickness of the photo-insensitive layer is between approximately 0.1 and 8 μm .

29. The method of claim 19, wherein the thickness ratio of the photo-insensitive layers to the total thickness of the photo-sensitive layer and photo-insensitive layer is not more than approximately 50%.

30. The method of claim 19, wherein the dielectric constant of the photo-sensitive layer is between approximately 2.5 and 4.0.

31. The method of claim 19, wherein the dielectric constant of the photo-insensitive layer is between approximately 1.5 and 3.5.

32. The method of claim 19, wherein the combined dielectric constant of the photo-sensitive layer and the photo-insensitive layer is between approximately 1.5 and 3.5.

33. The method of claim 19, wherein the photosensitive layer has a thickness of approximately 1.5 μm and photo-insensitive layer has a thickness of approximately 1.5 μm .

34. A liquid crystal display (LCD) device comprising:
an insulating substrate,
a gate bus line formed overlying the substrate;
a gate insulating layer formed over the gate bus line;
a drain electrode formed over the gate insulating layer; and
a multi-layer interlayer insulator formed overlying the drain electrode, the multi-layer interlayer insulator having a through hole.

35. The LCD device of claim 34, further comprising:
a pixel electrode formed over the multi-layer interlayer insulator including the through hole.

36. The LCD device of claim 34, wherein the multi-layer interlayer insulator comprises a photo-sensitive resin and a photo-insensitive resin overlying the photo-sensitive resin.

37. The LCD device of claim 36, wherein the photo-insensitive resin is selected from the group consisting of photo-insensitive PFCB, photo-insensitive BCB, photo-insensitive polyimide and photo-insensitive SOG.

38. The LCD device of claim 36, wherein the photo-sensitive layer is formed of one selected from the group consisting of photo-sensitive acrylic resin, photo-sensitive BCB, photo-sensitive PFCB and photo-sensitive polyimide.

39. The LCD device of claim 34, wherein the thickness of the photo-sensitive layer is between approximately 0.1 and 8 μm .

40. The LCD device of claim 34, wherein the thickness of the photo-insensitive layer is between approximately 0.1 and 8 μm .

41. The LCD device of claim 34, wherein the thickness ratio of the photo-insensitive layers to the total thickness of the photo-sensitive layer and photo-insensitive layer is not more than approximately 50%.

42. The LCD device of claim 34, wherein the dielectric constant of the photo-sensitive layer is between approximately 2.5 and 4.0.

43. The LCD device of claim 34, wherein the dielectric constant of the photo-insensitive layer is between approximately 1.5 and 3.5.

44. The LCD device of claim 34, wherein the combined dielectric constant of the photo-sensitive layer and the photo-insensitive layer is between approximately 1.5 and 3.5.

45. The LCD device of claim 34, wherein the photosensitive layer has a thickness of approximately 1.5 μm and photo-insensitive layer has a thickness of approximately 1.5 μm .

46. A liquid crystal display (LCD) device comprising:
a transparent insulating substrate,
a gate bus line formed overlying the substrate;
a gate insulating layer formed over the gate bus line;
5 a drain electrode formed over the gate insulating layer;
a multi-layer interlayer insulator formed overlying the drain electrode, the multi-layer
interlayer insulator having a through hole; and
a transparent electrode formed over the multi-layer interlayer insulator including the
through hole,
10 wherein the multi-layer interlayer insulator comprises a photo-sensitive resin and a
photo-insensitive resin overlying the photo-sensitive resin.

47. The LCD device of claim 46, wherein the photo-insensitive resin is selected from the
group consisting of photo-insensitive PFCB, photo-insensitive BCB, photo-insensitive
15 polyimide and photo-insensitive SOG.

48. The LCD device of claim 46, wherein the photo-sensitive layer is formed of one
selected from the group consisting of photo-sensitive acrylic resin, photo-sensitive BCB,
photo-sensitive PFCB and photo-sensitive polyimide.
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